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Paredes et al.

[11] **3,822,110**

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[54] **ADJUSTABLE BURNER**

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[52] **U.S. Cl.** **431/174**, 431/175, 431/186, 431/189, 239/580

[51] **Int. Cl.** **F23c 5/00**

[58] **Field of Search** 431/175, 174, 178, 179, 431/186, 189, 283; 239/588

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[57] **ABSTRACT**

A burner unit is provided with a housing in which a plurality of nozzles are removably coupled to a fuel supply. The burner nozzles are mounted in the housing for axial and rotatable movement.

1 Claim, 4 Drawing Figures

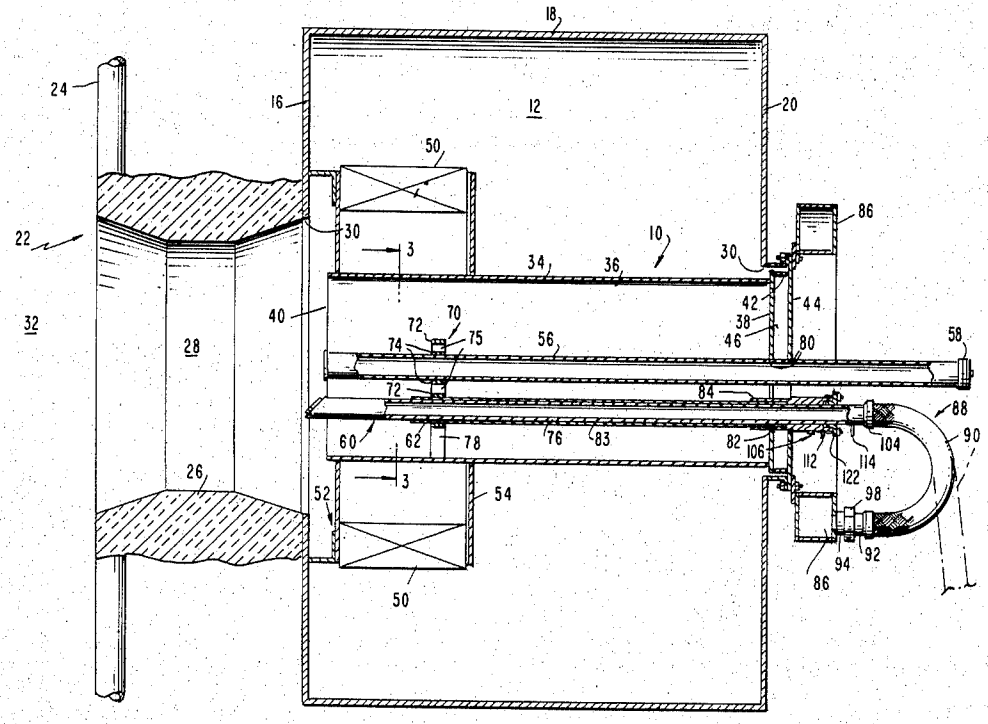

FIG. 1

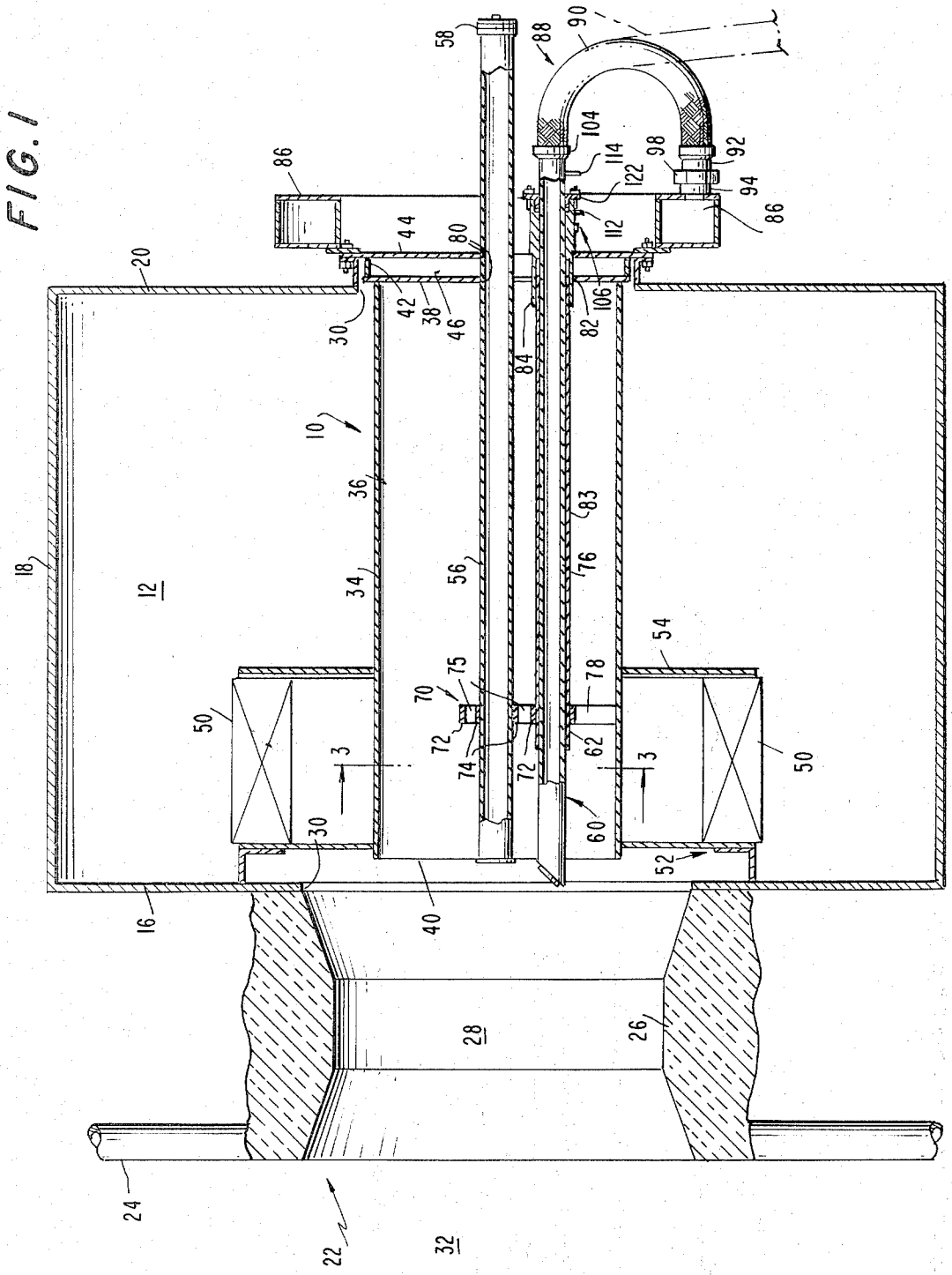
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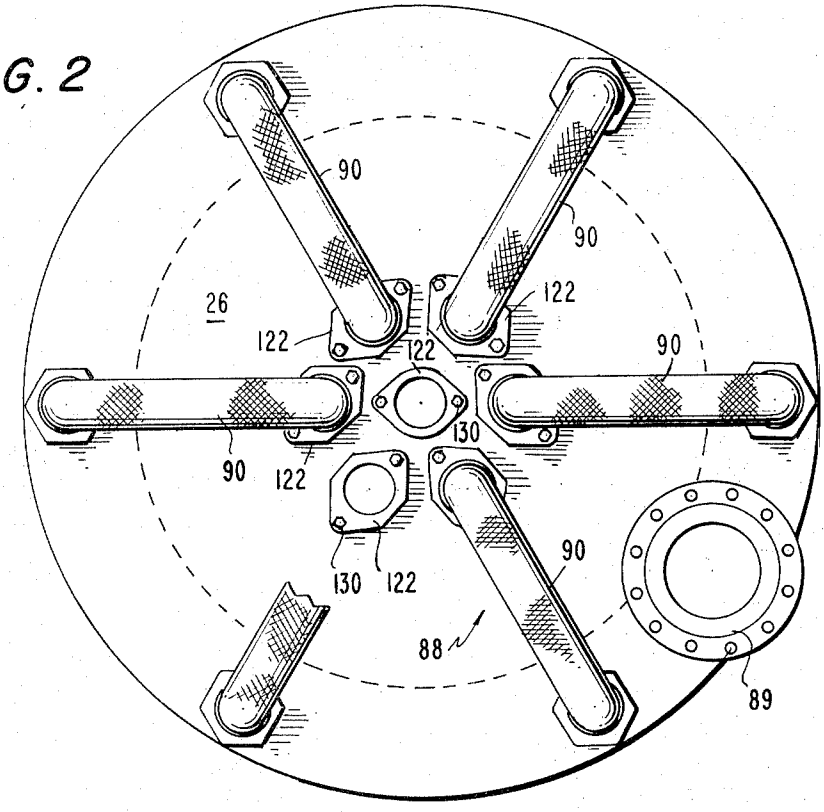
FIG. 2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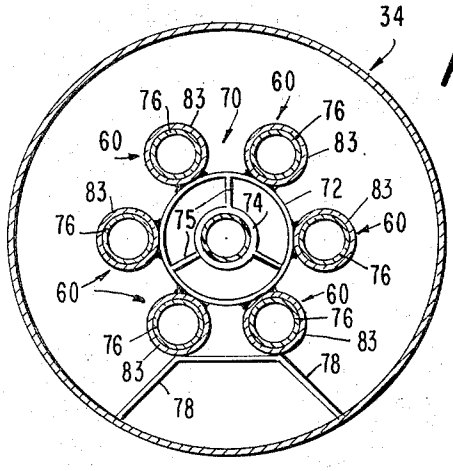
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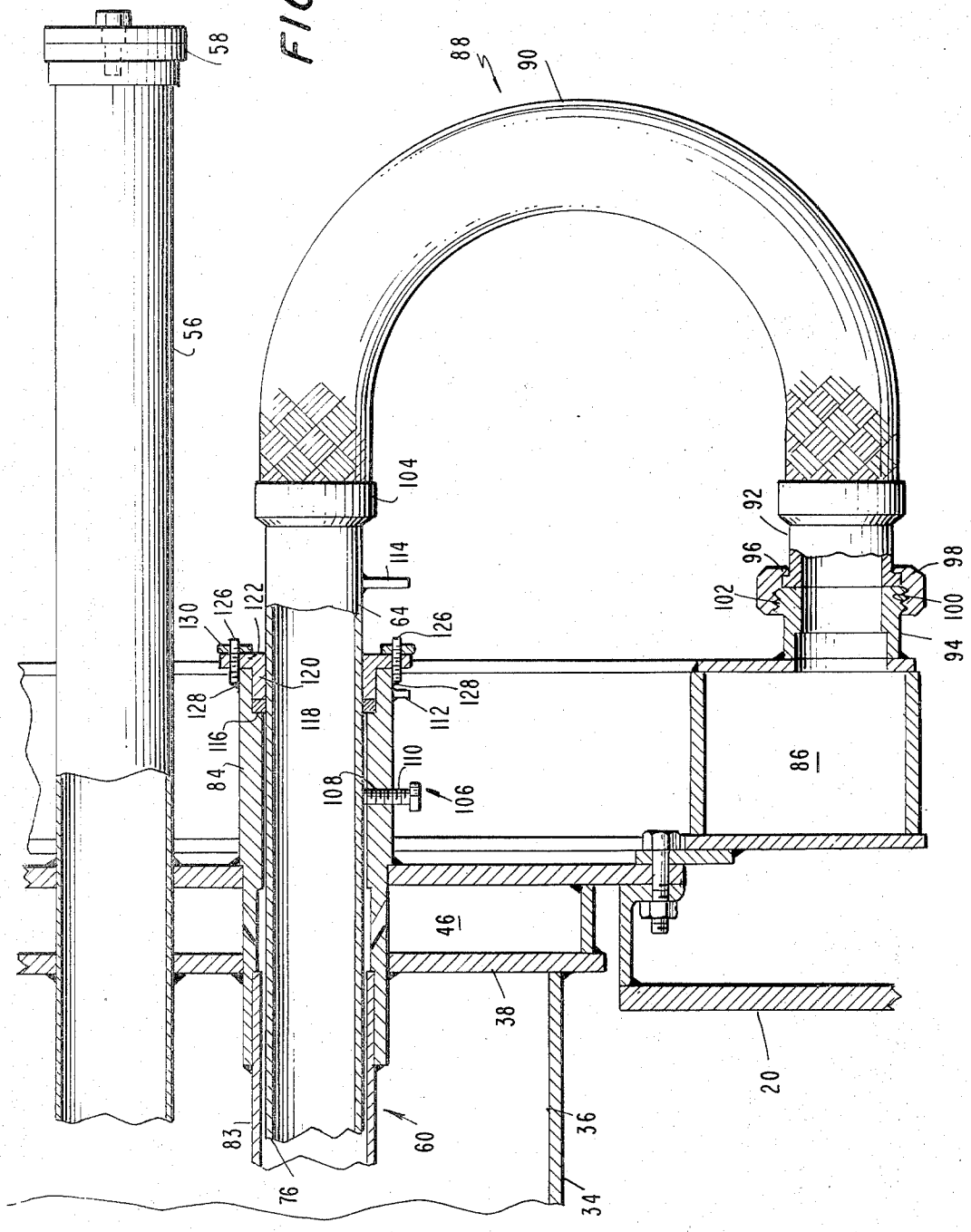
FIG. 3

FIG. 4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ADJUSTABLE BURNER

BACKGROUND OF THE INVENTION

In the operation of large vapor generators, it has become necessary to employ a burner system having a plurality of nozzles that are capable of being easily adjusted. The fixed type of multi-nozzle gas burners which heretofore have been used do not provide for adjustment of the nozzle, either axially of rotatably with respect to the nozzle axes. This necessitates difficult modifications to the burners in order to adjust the nozzle to avoid excess vibration and flame instability in the burner assembly. In the use of prior burner assemblies, it has often been necessary to use cutting torches to free the burners for adjustment and then reweld the burner nozzles in order to alleviate the vibration problem. The burner assembly of the present invention is capable of being adjusted either axially or rotatably or both axially and rotatably, such that the burner nozzles can be positioned in the most optimum location for reducing vibration and achieving flame stability. Also, it is highly desirable to be able to reposition the burner nozzle in a series of different positions until the most optimum location is found, as opposed to the fixed system of prior burner units which required difficult cutting and rewelding operations.

SUMMARY OF THE INVENTION

In accordance with an illustrative embodiment demonstrating features and advantages of the present invention, there is provided a burner assembly capable of being connected to a fuel supply including a housing for mounting cylindrical burner nozzles. A plurality of cylindrical burner nozzles are movably mounted in the housing. Coupling means capable of being disconnected are in flow communication between the fuel supply and the nozzles. Adjustment means for movably mounting the burner nozzles are in the housing to axially move and rotate the burner nozzles after the coupling means have been disconnected. Thus, the burner nozzles can be moved into an optimum position to reduce vibration of the burner nozzles in the housing.

BRIEF DESCRIPTION OF THE DRAWINGS

The above brief description, as well as further objects, features, and advantages of the present invention will be more fully appreciated by reference to the following detailed description of a presently preferred but nonetheless illustrative embodiment in accordance with the present invention, when taken in connection with the accompanying drawings wherein:

FIG. **1** is a front elevational view of a burner assembly with portions being broken away and sectioned to better show the adjustment means of the present invention;

FIG. **2** is an enlarged side elevational view of the burner assembly of FIG. **1**, showing the fuel coupling arrangement;

FIG. **3** is a sectional view of the burner assembly shown in FIG. **1**, taken through the line **3—3**, to more clearly show the support for mounting the burner nozzle, and

FIG. **4** is an enlarged sectional view of a portion of the burner shown in FIG. **1**, showing the fuel coupling arrangement in greater detail.

DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference to FIG. **1**, there is shown a burner assembly generally designated by the reference numeral **10** which is shown mounted in a windbox **12** which is defined by a front wall **16**, side wall **18**, and rear wall **20**. The windbox **12** is mounted on a furnace wall setting **22** which includes a fin-tube wall **24** formed with an insulated annular throat **26** which defines a throat opening **28**. The windbox **12** is formed with a cylindrical through bore **30** for receiving the burner assembly **10**, with windbox **12** being positioned with respect to throat opening **28** such that the burner assembly **10** is placed in flow communication with the interior of furnace chamber, generally designated **32**.

The burner assembly **10** comprises an outer housing generally designated **34** which is mounted in the windbox **12**. The housing **34** is defined by a burner barrel **36**, a rear end plate **38**, and a front barrel opening **40**. A cylindrical wall **42** is secured on the rear end plate **38** for mounting a circular outer plate **44** to define a purge and seal air manifold **46**.

An air register **50** is mounted in the windbox **12** by means of an air register assembly **52** secured to front wall **16** and an air register back plate **54** which is fixed to burner barrel **36**.

A central oil gun mounting tube **56** in the form of a cylindrically shaped tube is mounted on the end plate **38** in a fixed position and extends through the housing **34** for mounting an oil gun in the mounting tube **56**. As best shown in FIG. **4**, the oil gun mounting tube **56** is provided with a removably secured cover plate **58**.

A plurality of gas guns **60** in the form of cylindrically shaped nozzle tubes are installed in a plurality of gas gun mounting tubes **62** which are mounted on end plate **38** and are positioned to surround the oil gun mounting tube **56**. Each gas gun **60** is defined by a cylindrical wall **64** formed with a rearward opening **66** and a forward exhaust opening **68**, with the exhaust opening **68** having a slanted configuration. It should be noted that the gas gun **60** and the oil gun, which can be positioned in mounting tube **56**, can work independently of each other depending on the mode of operation required and the only additional equipment required is an ignition means which is well known in the art and has not been shown in the drawings for the sake of simplicity.

As best shown in FIG. **3**, the gas gun mounting tubes **62** and central oil gun mounting tube **56** are mounted on a support spider generally designated **70**. The support spider **70** is comprised of an outer collar **72** and an inner collar **74** for receiving oil gun mounting tube **56**. Three legs **75** are provided for mounting the outer collar **72** to the inner collar **74**. A plurality of guide tube ferrules **76** having a generally cylindrical configuration are welded along the outer periphery of outer collar **72** and the two lowermost guide tube ferrules **76** are mounted on a support stand **78** which serves as a mounting for support spider **70**. The rear end plate **38** and outer plate **44** are formed with through openings **80** for receiving oil gun mounting tube **56** and through openings **82** for receiving gas gun mounting tubes **62**. Each of the gas gun mounting tubes **62** is comprised of a front tube **83** that is welded to a rear tube **84** which is received in through opening **82**. The gas gun mounting tube **62** is welded to the purge and seal air mainfold

46. For the sake of simplifying the drawings, the fuel oil gun has not been shown in the drawings.

An annular gas supply manifold **86** is mounted on outer plate **44**, and flexible hose connections **88** are connected in flow communication between gas guns **60** and gas supply manifold **86**. As shown in FIG. **4**, the gas supply manifold **86** is connected to a fuel inlet **89**. The hose connections **88** are formed in the shape of a gas-tight cylinder **90** of a suitable length and fabricated from a flexible material having a wire mesh, stainless steel, outer covering which is secured to a rear tube connection **92**. As best shown in FIG. **4**, the hose connections **88** are connected to gas supply manifold **86** by means of end sleeves **94** that are welded to manifold **86**. The rear tube connections **92** are formed with shoulders **96** for receiving a union coupler **98** having internal threads **100** for threadably engaging external threads **102** formed on end sleeve **94**. The end of flexible hose connection **88** opposite to the rear tube connection **92** is fixed to a front end sleeve **104** which in turn is welded to the end of the cylindrical wall **64** of gas gun **60**.

Turning to FIG. **4**, adjustment means generally designated **106** are provided for axially moving and rotating the burner gas guns **60**. The adjustment means **106** comprise two internally threaded holes **108** formed on rear tube **84** engaging a plurality of externally threaded set screws **110**.

The degree of rotation and axial movement of gas guns **60** can be observed by a fixed post indicator **112** which is welded to rear tube **84** and a movable post indicator **114** which is welded to gas gun **60**. Thus, the distance between the post indicators **112** and **114** readily shows the axial position of gas guns **60** in the gas gun mounting tube **62**. Also, the rotatable alignment of the indicators **112** and **114** shows the degree of rotation of gas gun **60** in mounting tube **62**.

As best shown in FIG. **4**, the rear tube **84** is formed with a counterbored recess **116** for receiving a packing gland **118** and a cylindrical insert **120** integrally formed with a radial shoulder gasket **122**. The shoulder gasket **122** is formed with through openings **124** for freely passing through threaded studs **126** which are secured to the outer periphery of rear tube **84** by the weld **128**. The shoulder gaskets **120** are maintained in position by threadably engaging bolts **130** with the studs **126** to securely maintain the packing gland **118** in the counterbored recess **116**. The shoulder gaskets **120**, threaded studs **126** and bolts **130** also serve as a means of sealing the oil gun mounting tube **56**.

In order to change the axial position of the gas guns **60**, it is merely necessary to loosen the set screw **110** and move the gas gun **60** in the guide tube ferrule **76**. In this manner, due to the flexibility of the hose connection **88**, it is possible to axially move the gas gun **60** the required distance and then tighten the set screws **110**. The rotatable position of the gas guns **60** is changed by loosening the set screws **110** in the same manner as for changing the axial position, and then the union coupler **98** is disengaged such that the hose connection **88** can be moved to the broken line position shown in FIG. **1**. In this manner, the gas gun **60** is free to rotate in guide tube ferrule **76** in order to obtain an optimum position, and the set screws **110** are tightened until secure contact is made with the gas gun **60**. Once the gas gun **60** has been placed in a fixed position, the union coupler **98** is engaged with the threaded end of end sleeve **94**.

A latitude of modification, change and substitution is intended in the foregoing disclosure and in some instances some features of the invention will be employed without a corresponding use of other features. Accordingly, it is appropriate that the appended claims be construed broadly and in a manner consistent with the spirit and scope of the invention herein.

What is claimed is:

1. A burner assembly capable of being connected to a fuel supply comprising: a cylindrical housing for mounting burner nozzles; a plurality of cylindrical burner nozzles axially and rotatably movably mounted in said housing; ferrule tubes having a cylindrical configuration similar to said burner nozzles and sized to receive same, and means mounting said tubes about a central axis in said housing; coupling means including cylindrically shaped flexible hoses fabricated of a flexible material in flow communication between an annular fuel supply manifold and said nozzles and threaded connections comprising a union mounted on an end of said hoses and said fuel supply manifold such that the hoses can be disengaged from the fuel supply manifold for adjustment of the burner nozzles; adjustment means including set screws threaded in openings in said ferrule tubes engaging with the nozzles for securing same in place when tightened and permitting the rotatable and axial adjustment of the nozzles when loosened, and first and second indicator posts respectively mounted on each of said ferrule tubes and nozzle tubes for providing relative indication of radial an axial position of the nozzles in the ferrule tubes.

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